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TENNESSEE VALLEY AUTHORITY

ORIGINAL

ERRATA SHEET
FOR
ENVIRONMENTAL RADIOACTIVITY LEVELS
BELLEFONTE NUCLEAR PLANT
ANNUAL REPORT - 1982

1. Page 9, table 4, section E. Milk, date 10/82, TVA average under EARL for strontium-90--"12.8" should read "19.2."

RADIOLOGICAL HEALTH STAFF

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ENVIRONMENTAL RADIOACTIVITY LEVELS
BELLEFONTE NUCLEAR PLANT
ANNUAL REPORT - 1982
TVA/POWER/RHS

May 1983

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ENVIRONMENTAL RADIOACTIVITY LEVELS

BELLEFONTE NUCLEAR PLANT

ANNUAL REPORT

1982

Introduction

The Bellefonte Nuclear Plant (BLN), being constructed by the Tennessee Valley Authority, is located in Jackson County, Alabama, on a peninsula bounded on the west by Town Creek embayment and on the east by Guntersville Reservoir at Tennessee River Mile (TRM) 391.5 (see figure 1). The site is approximately 6 miles (10 kilometers) northeast of Scottsboro, Alabama. The plant will consist of two pressurized water reactors; each unit is rated at 3,620 MWt and 1,271 MWe. Fuel load in unit 1 is scheduled for no earlier than 1985.

A preoperational environmental radiological monitoring program was implemented in August 1978. This program has the objective of establishing a baseline of data on the distribution of natural and manmade radioactivity in the environment near the plant site. This report presents the results obtained from that program during 1982.

The Radiological Health Staff (Office of Power) and the Office of Natural Resources carried out the sampling program outlined in table 1. Sampling locations are shown in figures 2, 3, and 9 and table 2 describes the locations of the atmospheric and terrestrial monitoring stations. All the radiochemical and instrumental analyses were conducted in TVA's Western Area Radiological Laboratory (WARL) located at Muscle Shoals, Alabama, and Eastern Area Radiological Laboratory (EARL) at Vonore, Tennessee, with WARL being the primary laboratory for processing samples from BLN. Alpha and beta analyses were performed on Beckman Low Beta II, Beckman Wide Beta II, and Tennelec LB5100 low background proportional counters. Nuclear Data (ND) Model 100 multichannel analyzer systems employing sodium iodide, NaI(Tℓ), detectors and ND Model 4420 Systems in conjuction with germanium, Ge(Li), detection systems were used to analyze the samples for specific gamma-emitting radionuclides. At EARL an ND Model 6620 system is used with both types of detectors. Samples of water, vegetation, air particulates, food crops, and charcoal (specific analysis for ^{131}I) are routinely counted with NaI(Tℓ) detection systems. If significant concentrations of radioisotopes are identified, or if there is a reasonable expectation of increased radioactivity levels (such as during periods of increased fallout), these samples are counted on the Ge(Li) system. Identification of gamma-emitting radionuclides in all other types of samples is routinely performed by analysis on the Ge(Li) system. TVA-fabricated and Tennelec beta-gamma coincidence counting systems are utilized for the determination of ^{131}I concentrations in milk. Tritium determinations are made with Beckman LS150, Beckman LS100C, and Packard Model 3250 liquid scintillation counting systems.

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Data were entered in computer storage for processing specific to the analysis conducted. A computer, employing an ALPHA-M least-squares code, using multimatrix techniques was used to estimate the activities of the gamma-emitting nuclides analyzed by NaI(Tℓ). The data obtained by Ge(Li) detectors were resolved by the appropriate analyzer software and the metric minimization routine HYPERMET.

The detection capabilities for environmental sample analysis given as the nominal lower limits of detection (LLD) are listed in table 3. Samples processed by NaI(Tℓ) gamma spectroscopy were analyzed for 14 specific gamma-emitting radionuclides and radionuclide combinations[a]. For these analyses, radionuclide combinations such as ^{103,106}Ru and ^{95}Zr-Nb are analyzed as one radionuclide. All photopeaks found in Ge(Li) spectra were identified and quantified. Many of the isotopes identified by Ge(Li) spectral analysis are naturally occurring or naturally produced radioisotopes, such as ^{7}Be, ^{40}K, ^{212}Bi, ^{214}Bi, ^{212}Pb, ^{214}Pb, ^{226}Ra, etc. LLDs for the analysis of the radionuclides listed below[a] are given in table 3B. LLDs for additional radionuclides identified by Ge(Li) analysis were calculated for each analysis, and nominal values are listed in the appropriate data tables. In the instance where an LLD has not been established, an LLD value of zero was assumed. A notation in a table of "__ values <LLD" for an isotope with no established LLD does not imply a value less than 0; rather, it indicates that the isotope was not identified in that specific group of samples. For each sample type, only the radionuclides for which values greater than the LLD were reported are listed in the data tables.

TVA's radioanalytical laboratories participate in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by EPA-Las Vegas. This program provides periodic cross-check samples of the type and radionuclide composition normally analyzed in an environmental monitoring program. Routine sample handling and analysis procedures were employed in the evaluation of these samples. The results received during calendar year 1982 are shown in table 4. The $\pm 3\sigma$ limits based on one measurement were divided by the square root of 3 to correct for triplicate determinations.

---

[a]The following radionuclides and radionuclide combinations are quantified by the ALPHA-M least-squares computer code: ^{141,144}Ce; ^{51}Cr; ^{131}I; ^{103,106}Ru; ^{134}Cs; ^{137}Cs; ^{95}Zr-Nb; ^{58}Co; ^{54}Mn; ^{65}Zn; ^{59}Fe; ^{60}Co; ^{40}K; and ^{140}Ba-La.

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Table 1

ENVIRONMENTAL RADIOACTIVITY SAMPLING SCHEDULE
BELLEFONTE NUCLEAR PLANT

Station Location	Air Filter	Charcoal Filter	Rain-water	Heavy Particle Fallout	Vegetation	Milk	Well Water	Public Water	Surface Water	Fish
Site SW	W	W	M	M	Q					
Site NE	W	W	M	M	Q					
Scottsboro	W	W	M	M	Q			M		
Hollywood	W	W	M	M	Q			M		
Fackler	W	W	M	M	Q					
Stevenson	W	W	M	M	Q					
Pisgah	W	W	M	M	Q					
Section	W	W	M	M	Q					
Lim Rock (Control)	W	W	M	M	Q					
Rainsville (Control)	W	W	M	M	Q					
Farm S					Q	M				
Farm D (Control)							M			
Farm C (Control)					Q	M				
Well A (Control)							M			
Onsite Wells (6)							M			
Sand Mountain Water & & Fire Protection Authority								M		
Widows Creek Steam Plant (Control)								M		
Wheeler Reservoir										S[a]
Guntersville Reservoir									Q	S[a]
Nickajack Reservoir (Control)										S[b]

W - Weekly M - Monthly (every four weeks) Q - Quarterly S - Semiannually

[a]Samples collected as a part of the Browns Ferry Nuclear Plant monitoring program.

[b]Samples collected as a part of the Sequoyah Nuclear Plant monitoring program.

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Table 2

Atmospheric and Terrestrial Monitoring Stations Locations
Bellefonte Nuclear Plant

Sample Station	Approximate Distance and Direction from Plant	
Indicator Stations		
LM - 1 BL, Southwest	3/4 mile (1-1/4 kilometers)	SW
LM - 2 BL, Northeast	1 mile (1-1/2 kilometers)	NE
PM - 1 BL, Scottsboro, AL	5-3/4 miles (9-1/4 kilometers)	WSW
PM - 2 BL, Hollywood, AL	2 miles (3-1/4 kilometers)	WNW
PM - 3 BL, Fackler, AL	5-1/4 miles (8-1/2 kilometers)	N
PM - 4 BL, Stevenson, AL	11 miles (17-3/4 kilometers)	NNE
PM - 5 BL, Pisgah, AL	4 miles (6-1/2 kilometers)	ESE
PM - 6 BL, Section, AL	9 miles (14-1/2 kilometers)	SSW
Farm S	5 miles (8 kilometers)	SW
Control Stations		
RM - 1 BL, Lim Rock, AL	18 miles (29 kilometers)	W
RM - 2 BL, Rainsville, AL	14-1/2 miles (23-1/3 kilometers)	SSE
Farm C	11-1/2 miles (18-1/2 kilometers)	SSW
Farm D	1 mile (1-2/3 kilometers)	W
Well A	1-1/2 miles (2-1/2 kilometers)	NNE

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Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

A. Specific Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)*

	Air Particulates pCi/m^3	Charcoal pCi/m^3	Fallout mCi/km^2	Water pCi/l	Vegetation and grain pCi/g, dry	Soil and Sediment pCi/g, dry	Fish, clam flesh, plankton, pCi/g, dry	Clam shells pCi/g, dry	Foods, meat, poultry, pCi/kg, wet	Milk pCi/l
Total α				0.4	0.01				1.5	
Gross α	0.005			2.0	0.05	0.35	0.1	0.7		
Gross β	0.01		0.05	2.4	0.20	0.70	0.1	0.7	25	
^{3}H				330						0.5
^{131}I		0.02								
^{89}Sr	0.005			10	0.25	1.5	0.5	5.0	40	10
^{90}Sr	0.001			2	0.05	0.3	0.1	1.0	8	2

*All LLD values for isotopic separations are calculated by the method developed by Pasternack and Harley as described in HASL-300. Factors such as sample size, decay time, chemical yield, and counting efficiency may vary for a given sample; these variations may change the LLD value for the given sample. The assumption is made that all samples are analyzed within one week of the collection date. Conversion factors: 1 pCi = 3.7×10^{-2} Bq; 1 mCi = 3.7×10^{7} Bq.

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Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

B. Gamma Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)

	Air particulates pCi/m³		Water and milk pCi/l		Vegetation and grain pCi/g, dry		Soil and sediment pCi/g, dry		Fish pCi/g, dry		Clam flesh and plankton pCi/g, dry	Clam shells pCi/g, dry		Foods, (tomatoes potatoes, etc.) pCi/kg, wet		Meat and poultry pCi/kg, wet	
	NaI*	Ge(Li)**	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)		NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)
^{141,144}Ce	0.03		38		0.55		0.35		0.35			0.35		30		90	
^{144}Ce		0.02		33		0.22		0.06		0.06	0.35		0.06		33		40
^{51}Cr	0.07	0.03	60	44	1.10	0.47	0.60	0.10	0.60	0.10	0.56	0.60	0.10	60	44	200	90
^{131}I	0.01	0.01	15	8	0.35	0.09	0.20	0.02	0.20	0.02	0.07	0.20	0.02	15	8	50	20
^{103,106}Ru	0.04		40		0.65		0.45		0.45			0.45		40		150	
^{106}Ru		0.03		40		0.51		0.11		0.11	0.74		0.11		40		90
^{134}Cs	0.01	0.02	10	26	0.20	0.33	0.12	0.08	0.12	0.08	0.48	0.12	0.08	10	26	40	50
^{137}Cs	0.01	0.01	10	5	0.20	0.06	0.12	0.02	0.12	0.02	0.08	0.12	0.02	10	5	40	15
^{95}Zr-Nb	0.01		10		0.20		0.12		0.12			0.12		10		40	
^{95}Zr		0.01		10		0.11		0.03		0.03	0.15		0.03		10		20
^{95}Nb		0.01		5		0.05		0.01		0.01	0.07		0.01		5		15
^{58}Co	0.02	0.01	15	5	0.23	0.05	0.20	0.01	0.20	0.01	0.07	0.20	0.01	15	5	55	15
^{54}Mn	0.02	0.01	10	5	0.20	0.05	0.15	0.01	0.15	0.01	0.08	0.15	0.01	10	5	40	15
^{65}Zn	0.02	0.01	15	9	0.25	0.11	0.23	0.02	0.23	0.02	0.17	0.23	0.02	15	9	70	20
^{60}Co	0.01	0.01	10	5	0.17	0.06	0.11	0.01	0.11	0.01	0.08	0.11	0.01	10	5	30	15
^{40}K	0.10		150		2.50		0.90		0.90			0.90		150		400	
^{140}Ba-La	0.02		15		0.68		0.15		0.15			0.15		15		50	
^{140}Ba		0.02		25		0.34		0.07		0.07	0.30		0.07		25		50
^{140}La		0.01		7		0.08		0.02		0.02	0.10		0.02		7		15

*The NaI(Tl) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300 and Nucl. Instr. Methods 91, 533-40 (1971). These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on a given sample. Water is counted in a 3.5-L Marinelli beaker. Vegetation, fish, soil, and sediment are counted in a 1-pint container as dry weight. The average dry weight is 120 grams for vegetation and 400-500 grams for soil sediment and fish. Meat and poultry are counted in a 1-pint container as dry weight, then corrected to wet weight using an average moisture content of 70%. Average dry weight is 250 grams. Air particulates are counted in a well crystal. The counting system consists of a multichannel analyzer and either a 4" x 4" solid or 4" x 5" well NaI(Tl) crystal. The counting time is 4000 seconds. All calculations are performed by the least-squares computer program ALPHA-M. The assumption is made that all samples are analyzed within one week of the collection date.

**The Ge(Li) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300. These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on given samples. Water is counted in either a 0.5-L or 3.5-L Marinelli beaker. Solid samples such as soil, sediment, and clam shells are counted in a 0.5-L Marinelli beaker as dry weight. The average dry weight is 400-500 grams. Air filters and very small volume samples are counted in petrie dishes centered on the detector endcap. The counting system consists of a ND-4420 multichannel analyzer and either a 25%, 14%, 16%, or 29% Ge(Li) detector. The counting time is normally 8 hours. All spectral analysis is performed using the software provided with the ND-4420. The assumption is made that all samples are analyzed within one week of the collection date.

Conversion factor: 1 pCi = 3.7×10^{-2} Bq.

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Table 4

Results Obtained in Interlaboratory Comparison Program

A. Air Filter (pCi/filter)

Date	Gross Alpha			Gross Beta			Strontium-90			Cesium-137		
	EPA value (±3σ)	TVA AVG.[b] WARL[a]	EARL	EPA value (±3σ)	TVA AVG. WARL	EARL	EPA value (±3σ)	TVA AVG. WARL	EARL	EPA value (±3σ)	TVA AVG. WARL	EARL
3/82	27±12	23	28	55±9	62	56	16±2.6	16	15	23±9	24	24
9/82	32±14	28	28	67±9	57[c]	52[c]	20±2.6	17[d,g]	14[g]	27±9	22	22

B. Tritium in Urine (pCi/L)

Date	EPA Value (±3σ)	TVA AVERAGE	
		WARL	EARL
5/82	1300±575	1793	1650[e]
12/82	3830±641	3510	4023

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Table 4 (Continued)

Results Obtained in Interlaboratory Comparison Program

C. Radiochemical Analysis of Water (pCi/L)

Date	Gross Alpha			Gross Beta			Strontium - 89			Strontium - 90			Tritium			Iodine -131		
	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
1/82	24±10	20	19	32±9	33	28	21±9	20	22	12±2.6	13	12				8.4±2.6[h]	8.7	7.3
2/82													1820±592	2007	1793			
3/82	19±9	19	20	19±9	19	20												
4/82													2860±624	2907	2923	62±11	61	61
5/82	27.5±12	27	38.3	29±9	26	33	22±9	24	22	13±2.6	11	8[g]						
6/82													1830±589	1620	1810	4.4±1.2[h]	5.3	3.6
7/82	16±9	13	32[f]	23±9	20	21												
8/82													2890±624	2903	2793			
9/82	29±13	26	--[f]	40±9	38	--[f]	24.5±9	30	21	14.5±2.6	13.8	14.8				87±15	93	79
10/82													2560±606	2690	2510			
11/82	19±9	19	15[f]	24±9	22	23												
12/82													1990±598	1943	1993	37±10	37	39

D. Gamma-Spectral Analysis of Water (pCi/L)

Date	Chromium - 51			Cobalt - 60			Zinc - 65			Ruthenium - 106			Cesium - 134			Cesium - 137		
	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
2/82	0	<44	<35	20±9	21	22	15±9	16	16	20±9	<40	<30	22±9	21	19	23±9	24	22
6/82	23±9	<44[d]	<35[i]	29±9	32[d]	34	26±9	29[d]	26	0	<40	<30	35±9	31[d]	32	25±9	24[d]	27
10/82	51±9	55[d]	<35[i]	20±9	18[d]	21	24±9	25[d]	25	30±9	39[d]	<36	19±9	19[d]	17	20±9	20[d]	22

Table 4 (Continued)

Results Obtained in Interlaboratory Comparison Program

E. Milk (pCi/L)

Date	Strontium - 89			Strontium - 90			Iodine - 131			Cesium - 137			Barium - 140			Potassium[j]			Cobalt - 60		
	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
4/82	25±9	29	28	16±2.6	16	13[k]															
7/82							5.4±1.4[h]	6.7	5.1	28±9	31	30	0	<25	<15	1500±130	1590	1413	30±6	32	29
10/82	0	<10	<10	18.6±2.6	19.5	12.8[k]	42±10	43	42	34±9	34	35	0	<25	<20	1560±135	1563	1639			

F. Foods (pCi/kg, Wet Weight)

Date	Strontium - 89			Strontium - 90			Iodine - 131			Cesium 137			Barium - 140			Potassium[j]		
	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
7/82	26±9	30	28	20±2.6	26[f,k]	27[k]	94±15	98	98	20-9	24	26	0	<25	<14	2400±208	2810[g]	2733[g]
11/82	0	<10	<40[d]	27.8±2.6	30.6[k]	24[d,k]	25±10	20	29	27±9	28	27	0	<25	<14	2780±242	2670	2903

[a] Western Area Radiological Laboratory, Muscle Shoals, Alabama

[b] Eastern Area Radiological Laboratory, Vonore, Tennessee

[c] No known explanation. Investigation underway.

[d] Analysis completed after report date

[e] Equipment malfunction, analysis completed after report date

[f] Poor analysis. Equipment taken out of service for recalibration. Further results satisfactory.

[g] Previous and Subsequent results satisfactory. No known explanation.

[h] NRC/EPA Low-level ^{131}I study.

[i] Experimental detection limit is being reviewed.

[j] Potassium values are mg/l or mg/kg.

[k] Review of procedure is in progress.

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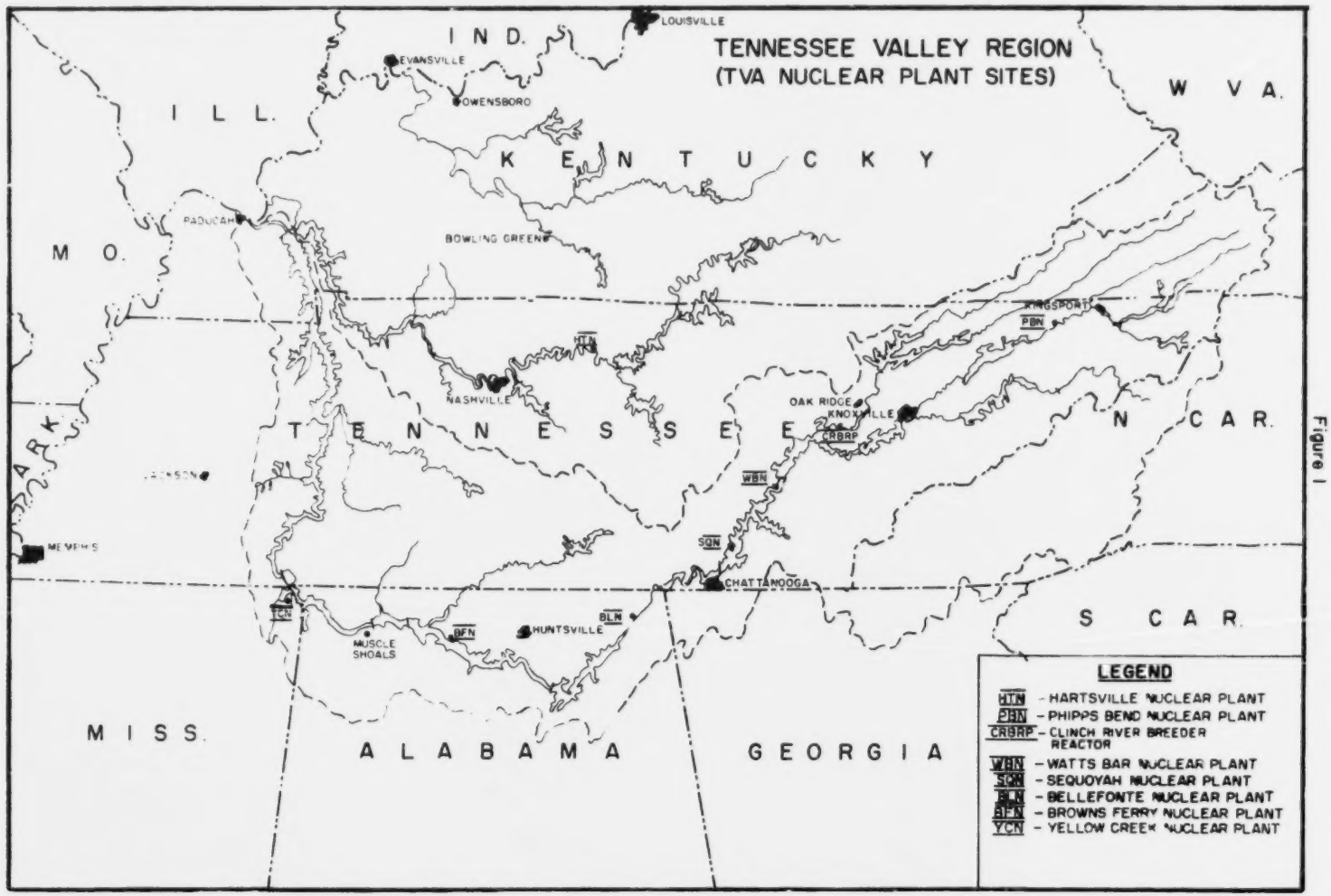

Figure 1

Atmospheric Monitoring

The atmospheric monitoring network is divided into three subgroups. Two local air monitors are located within the plant boundary. Six perimeter air monitors are located at distances out to 9 miles (14.5 kilometers) from the plant in the towns of Scottsboro, Hollywood, Fackler, Stevenson, Pisgah, and Section. Two remote air monitors are located at distances out to 18 miles (29 kilometers) from the plant in the Lim Rock community and the town of Rainsville (see table 2 and figures 2 and 3).

At each monitor, air is continuously pulled through a Hollingsworth and Vose LB5211 glass fiber particulate filter at a regulated flow of 3 ft^3/min (0.085 m^3/min). In series with, but downstream of, the particulate filter, is a charcoal filter used to collect iodine. Each monitor has a collection tray and storage container to collect rainwater on a continuous basis, and a horizontal platform covered with gummed acetate to catch and hold heavy particle fallout.

Each of the local and perimeter air monitors is fitted with a GM tube that continuously scans the particulate filter. The disintegration rate of the atmospheric radioactivity is continuously recorded at each station.

Air filters are collected weekly and analyzed for gross beta activity. During this period twenty-two samples were not collected because of equipment malfunction or station inaccessibility. Four of these missed samples resulted from recurring equipment problems at one station, accounting also for loss of one monthly composite. No analyses are performed until three days after sample collection. The samples are composited monthly for analysis of specific gamma-emitting radionuclides and quarterly for ^{89}Sr, ^{90}Sr analysis. The results are presented in table 6.

The annual averages of the gross beta activity in the air particulate filters at the indicator stations (local and perimeter monitors) and at the control stations (remote monitors) for the years 1978-1982 are presented in figure 4. Increased levels due to fallout from atmospheric nuclear weapons testing are evident in 1981. These fluctuations are consistent with data from monitoring programs conducted by TVA at other nuclear power plant sites.

Table 5 presents the maximum permissible concentrations (MPC) recommended by 10 CFR 20 for nonoccupational exposure.

Rainwater is collected and analyzed for specific gamma-emitting isotopes. A gamma scan is performed on a 3.5-liter monthly sample. The results are shown in table 7.

The gummed acetate that is used to collect heavy particle fallout is changed monthly. Eleven samples were damaged or destroyed and not available for analysis during this reporting period. The sample is ashed and counted for gross beta activity. The results are given in table 8.

Charcoal filters are collected weekly and analyzed for radioiodine. During this period, twenty-two samples were not collected because of equipment malfunction or station inaccessibility. The filter is counted in a single channel analyzer system. The data are shown in table 9.

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Table 5

MAXIMUM PERMISSIBLE CONCENTRATIONS

FOR NONOCCUPATIONAL EXPOSURE

	MPC	
	In Water pCi/l*	In Air pCi/m3*
Alpha	30	
Nonvolatile beta	3,000	100
Tritium	3,000,000	200,000
^{137}Cs	20,000	500
$^{103,106}Ru$	10,000	200
^{144}Ce	10,000	200
^{95}Zr-^{95}Nb	60,000	1,000
^{140}Ba-^{140}La	20,000	1,000
^{131}I	300	100
^{65}Zn	100,000	2,000
^{54}Mn	100,000	1,000
^{60}Co	30,000	300
^{89}Sr	3,000	300
^{90}Sr	300	30
^{51}Cr	2,000,000	80,000
^{134}Cs	9,000	400
^{58}Co	90,000	2,000
^{59}Fe	50,000	2,000

*1 pCi = 3.7×10^{-2} Bq.

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TABLE 6

RADIOACTIVITY IN AIR FILTER

PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 496	0.010	0.02(354/ 398) 0.01- 0.05	LM2 BL ENV DATA 1.0 MILE NE	0.02(48/ 51) 0.01- 0.04	0.02(95/ 100) 0.01- 0.06	
GAMMA (NAI) 72						
CE-141,144	0.030	0.03(1/ 55) 0.03- 0.03	LM2 BL ENV DATA 1.0 MILE NE	0.03(1/ 8) 0.03- 0.03	17 VALUES <LLD	
FE-59	NOT ESTAB	0.00(2/ 55) 0.00- 0.00	PM1 SCOTTSBORO,A 5.6 MILES WSW	0.00(2/ 8) 0.00- 0.00	17 VALUES <LLD	
I-131	0.010	0.02(5/ 55) 0.01- 0.02	PM5 PISGAH,AL 4.3 MILES ESE	0.02(1/ 7) 0.02- 0.02	0.02(3/ 17) 0.02- 0.02	
BE-7	NOT ESTAB	0.07(53/ 55) 0.02- 0.10	LM2 BL ENV DATA 1.0 MILE NE	0.08(7/ 8) 0.06- 0.09	0.07(17/ 17) 0.04- 0.09	
GAMMA (GELI) 57						
K-40	NOT ESTAB	0.02(32/ 48) 0.00- 0.10	PM6 SECTION,AL 9.2 MILES SSW	0.03(5/ 6) 0.00- 0.10	0.02(7/ 9) 0.00- 0.05	
BI-214	0.020	0.07(9/ 48) 0.03- 0.18	PM1 SCOTTSBORO,A 5.6 MILES WSW	0.12(1/ 5) 0.12- 0.12	9 VALUES <LLD	
PB-214	0.020	0.06(7/ 48) 0.04- 0.10	PM5 PISGAH,AL 4.3 MILES ESE	0.10(1/ 6) 0.10- 0.10	0.03(1/ 9) 0.03- 0.03	
PB-212	NOT ESTAB	0.00(23/ 48) 0.00- 0.01	LM2 BL ENV DATA 1.0 MILE NE	0.00(4/ 5) 0.00- 0.01	0.00(5/ 9) 0.00- 0.00	
RA-226	NOT ESTAB	0.02(4/ 48) 0.00- 0.07	PM6 SECTION,AL 9.2 MILES SSW	0.04(2/ 6) 0.01- 0.07	0.02(1/ 9) 0.02- 0.02	
BE-7	0.050	0.06(9/ 48) 0.05- 0.09	LM1 BL SOUTHWEST 0.8 MILE SW	0.08(1/ 4) 0.08- 0.08	0.05(1/ 9) 0.05- 0.05	
TL-208	NOT ESTAB	0.00(19/ 48) 0.00- 0.00	PM3 FACKLER,AL 5.2 MILES N	0.00(3/ 7) 0.00- 0.00	0.00(3/ 9) 0.00- 0.00	
AC-228	NOT ESTAB	0.01(3/ 48) 0.00- 0.02	PM3 FACKLER,AL 5.2 MILES N	0.01(2/ 7) 0.00- 0.02	0.00(1/ 9) 0.00- 0.00	
SR 89	0.005	32 VALUES <LLD			8 VALUES <LLD	
40		ANALYSIS PERFORMED				
SR 90	0.001	32 VALUES <LLD			8 VALUES <LLD	
40		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN[b] (F) RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI) 92						
FE-59	NOT ESTAB	4.21(10/ 73) 0.40- 7.30	LM2 BL ENV DATA 1.0 MILE NE	7.20(1/ 7) 7.20- 7.20	1.10(1/ 19) 1.10- 1.10	
BE-7	NOT ESTAB	42.08(46/ 73) 5.40- 89.00	PM3 FACKLER,AL 5.2 MILES N	46.73(6/ 10) 5.40- 89.00	46.38(15/ 19) 11.10- 88.40	
GAMMA (GELI) 38						
K-40	NOT ESTAB	14.82(7/ 31) 5.83- 30.42	PM5 PISGAH,AL 4.3 MILES ESE	25.69(2/ 5) 20.95- 30.42	7 VALUES <LLD	
SR-85	NOT ESTAB	14.89(1/ 31) 14.89- 14.89	PM3 FACKLER,AL 5.2 MILES N	14.89(1/ 3) 14.89- 14.89	7 VALUES <LLD	
BI-214	NOT ESTAB	6.96(4/ 31) 1.22- 15.86	LM2 BL ENV DATA 1.0 MILE NE	11.47(2/ 6) 7.08- 15.86	7 VALUES <LLD	
PB-214	NOT ESTAB	4.08(4/ 31) 0.56- 8.64	PM1 SCOTTSBORO,A 5.6 MILES WSW	8.64(1/ 5) 8.64- 8.64	7 VALUES <LLD	
PB-212	NOT ESTAB	2.43(10/ 31) 0.91- 4.38	PM2 HOLLYWOOD,AL 1.8 MILES WNW	4.38(1/ 2) 4.38- 4.38	0.37(3/ 7) 0.19- 0.49	
BE-7	NOT ESTAB	114.44(5/ 31) 34.99- 358.00	PM3 FACKLER,AL 5.2 MILES N	358.00(1/ 3) 358.00- 358.00	37.01(2/ 7) 32.16- 41.86	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 8

RADIOACTIVITY IN HEAVY PARTICLE FALLOUT

MCI/KM(2) - 37000000.00 BQ/KM(2)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY ICKSON — ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.050	0.16(95/ 95)	LM1 BL SOUTHWEST	0.19(12/ 12)	0.14(24/ 24)	
11-		0.06- 0.3[3]	0.8 MILE SW	0.11- 0.39	0.06- 0.39	

a. Nom 1 Lower Limit of Detection (LLD) as described in Table 3.

b. Mea. and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 9

RADIOACTIVITY IN CHARCOAL FILTERS

PCI/M(3) - 0.037 BQ/M(3)

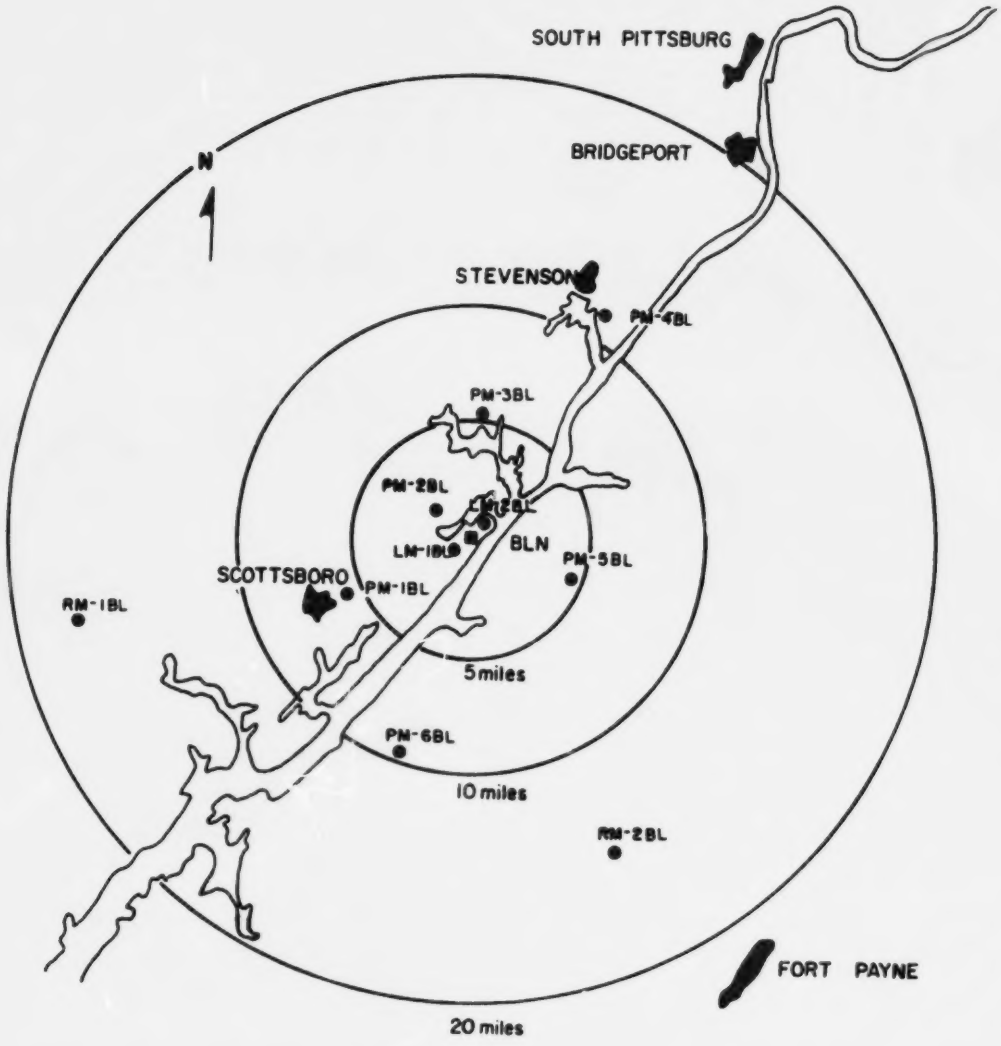
NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE IN AIR	0.020	0.03(38/ 398)	PM4 STEVENSON,AL	0.03(14/ 49)		0.03(11/ 100)	
493		0.02- 0.05	11.0 MILES NNE	0.02-	0.05	0.02- 0.06	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

Figure 2

BELLEFONTE NUCLEAR PLANT ATMOSPHERIC AND TERRESTRIAL MONITORING NETWORK



NOTE: THE FOLLOWING SAMPLES ARE COLLECTED FROM EACH STATION:

AIR PARTICULATES	RAINWATER
RADIOIODINE	SOIL
HEAVY PARTICLE FALLOUT	VEGETATION

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Figure 3

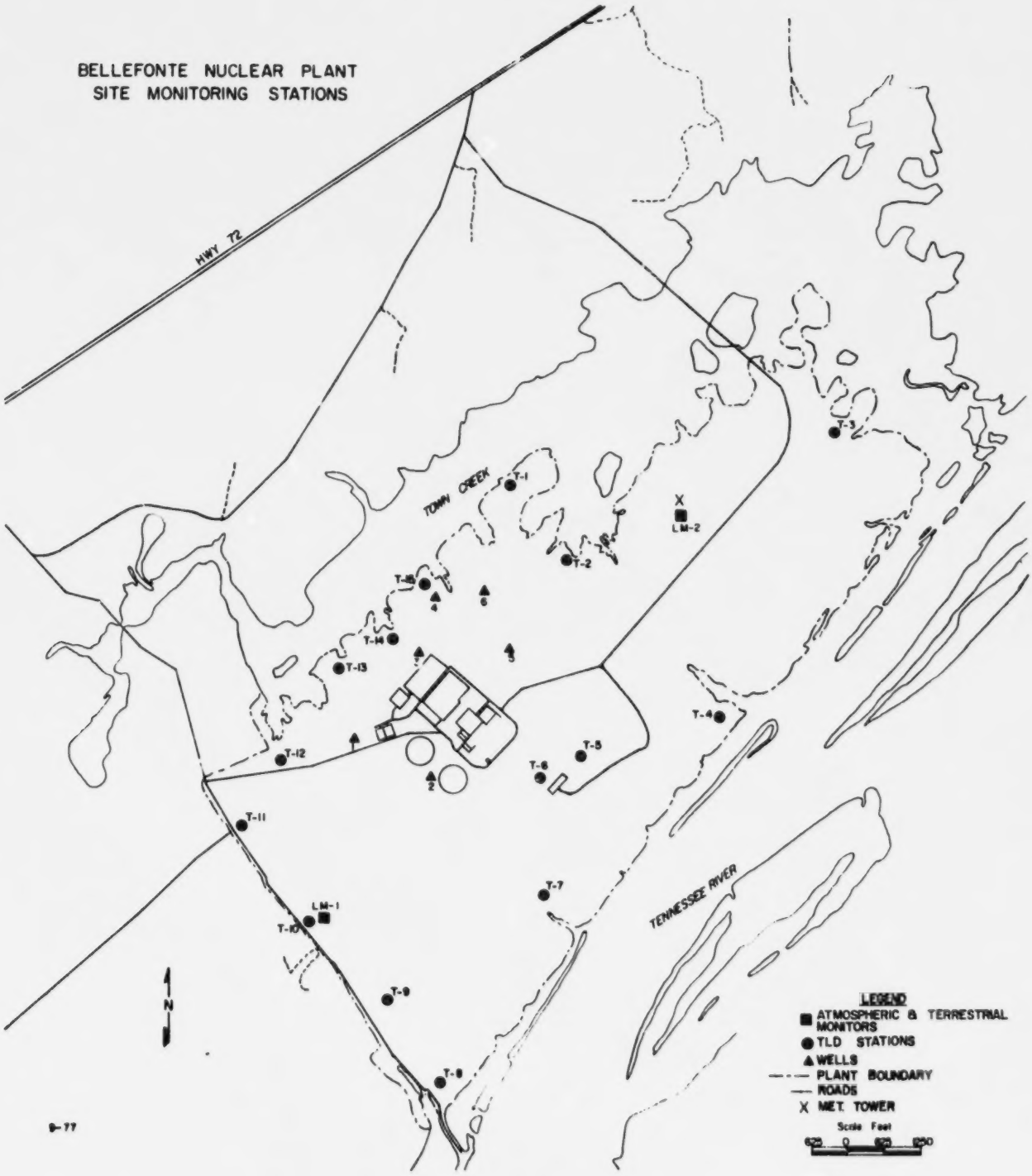

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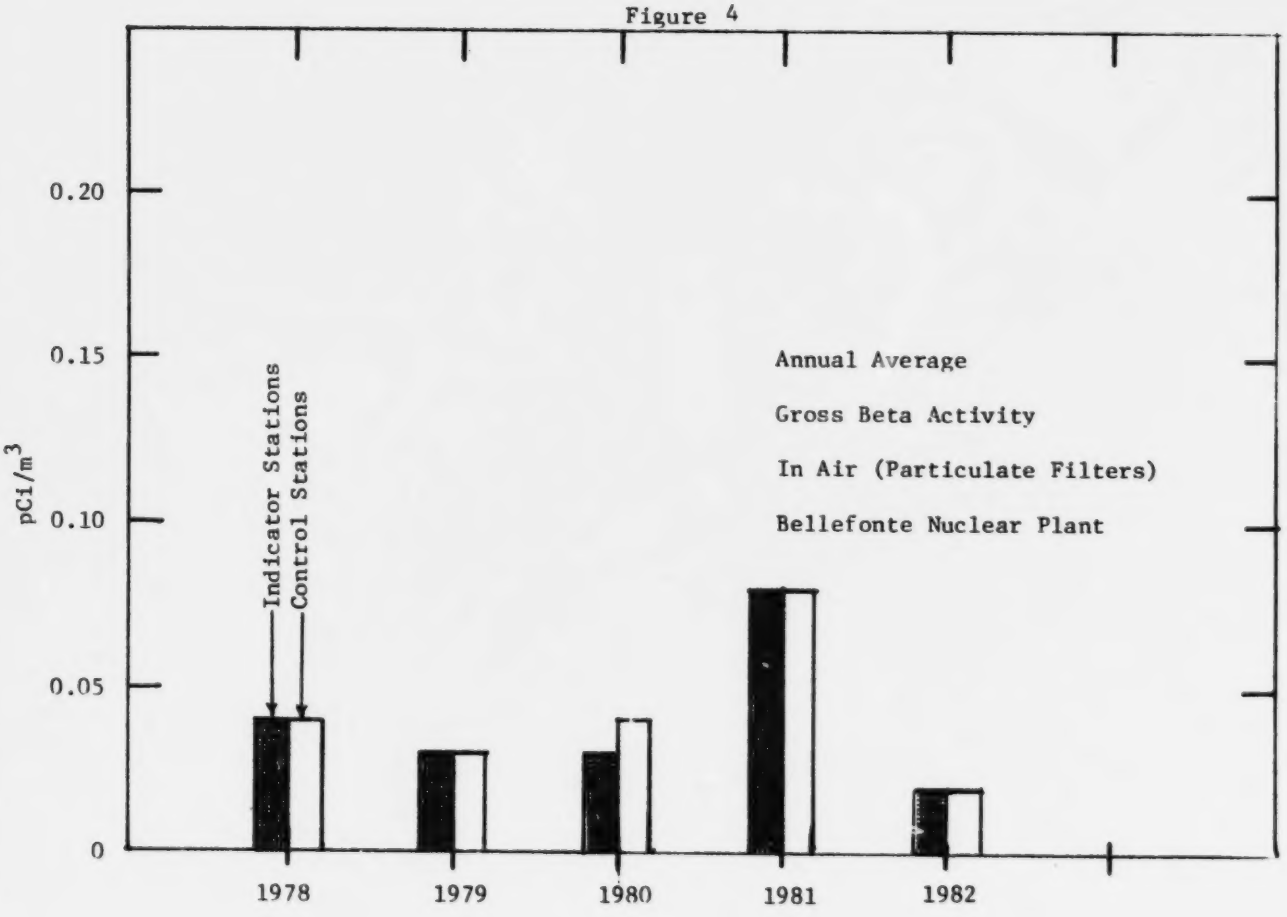
Figure 4



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Terrestrial Monitoring

Milk

Although there are no commercial dairy farms within five miles of the plant site, milk was collected, when available, from one farm producing milk for private consumption (see table 2), and from one control dairy farm. Raw milk was analyzed monthly for ^{131}I, gamma-emitting radionuclides, and for radiostrontium. The results are shown in table 10. During this reporting period, one sample spoiled and was not available for iodine and strontium analysis.

As had been noted in earlier monitoring reports, the levels of ^{90}Sr in milk samples from farms producing milk for private consumption only are up to six times the levels found in milk from commercial dairy farms. Samples of feed and water supplied to the animals were analyzed in 1979 in an effort to determine the source of the strontium. Analysis of dried hay samples indicated levels of ^{90}Sr slightly higher than those encountered in routine vegetation samples. Analysis of pond water indicated no significant strontium activity.

This phenomenon was also observed during preoperational monitoring at Sequoyah Nuclear Plant in samples taken from a farm where only one to two cows were being milked for private consumption of the milk. It is postulated that the feeding practices of these small farmers differ from those of the larger dairy farmers to the extent that fallout from atmospheric nuclear weapons testing may be more concentrated in these instances. Similarly, Hansen, et al., reported an inverse relationship between the levels of ^{90}Sr in milk and the quality of fertilization and land management.[a]

Vegetation

Vegetation samples were collected quarterly from the farms from which milk was collected, and from the vicinity of each atmospheric monitoring station and analyzed for gamma-emitting radionuclides. Approximately 1-2 kilograms of grass was broken or cut at ground level and returned for analysis. Efforts were made to sample vegetation that was representative of the pasturage where cattle graze. Table 11 gives the results obtained from the laboratory analyses.

Soil

Soil samples were collected semiannually near each monitoring station to provide an indication of any long-term buildup of radioactivity in the environment. An auger or "cookie cutter" type sampler was used to obtain samples of the top two inches (5 cm) of soil. These samples were analyzed for gamma-emitting radionuclides, ^{89}Sr, and ^{90}Sr. The results are given in table 12.

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[a] Hansen, W.G., et al., Farming Practices and Concentrations of Emission Products in Milk, U.S. Department of Health, Education, and Welfare; Public Health Service Publication No. 999-R-6, May 1964.

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Ground Water

Well water was obtained monthly from two farms in the area and from six onsite wells. All samples collected were analyzed for gamma-emitting radionuclides and a quarterly composite was analyzed for tritium. The results are shown in table 13. During this period 12 samples were not collected because the stations were inaccessible or equipment malfunction.

Public Water

Potable water supplies taken from the Tennessee River in the vicinity of BLN are sampled and analyzed for gross beta, gamma-emitting radionuclides, ^{89}Sr, ^{90}Sr, and tritium. The results are shown in table 14. Figure 5 shows the trends in gross beta activity in drinking water from 1978 through 1982.

Environmental Gamma Radiation Levels

Bulb-type Victoreen Manganese-activated calcium fluoride (CaF_2: Mn) thermoluminescent dosimeters (TLDs) are placed at 15 stations around the plant near the site boundary and at the perimeter and remote air monitors to determine the gamma exposure rates at these locations (see figures 2 and 3). In October 1981 three additional stations were established near the site boundary and TLDs were placed at 18 stations located in the different meteorological sectors around the plant at a distance of approximately 5 miles (figure 6). The dosimeters, in approximate energy compensating shields, are placed at approximately one meter above the ground, with two to three TLDs at each station. They are annealed and read with a Victoreen Model 2810 TLD reader. The values are corrected for gamma response, self-irradiation, and fading, with individual gamma response calibrations and self-irradiation factors determined for each TLD. The TLDs are exchanged every three months. The quarterly gamma radiation levels determined from these TLDs are given in table 15. It should be noted that even during the preoperational phase of the monitoring program, the average radiation levels onsite are generally 2-5 mR/quarter higher than the levels offsite. This is consistent with levels reported in other preoperational monitoring programs conducted by TVA where the average radiation levels onsite are generally 2-6 mR/quarter higher than levels offsite. The causes of these differences have not been completely isolated; however, it is postulated that the differences are probably attributable to combinations of influences, such as natural variations in environmental radiation levels, earth moving activities onsite, the mass of concrete employed in the construction of the plant, and other undetermined influences.

Figure 7 compares plots of the data from the onsite or site boundary stations with those from the offsite stations over the period from 1978 through 1982. To reduce the variations present in the data sets, a four-quarter moving average was constructed for each set. Figure 8 presents a trend plot of the direct radiation levels as defined by the moving averages. The data follow the same general trend as the raw data, but the curves are smoothed considerably.

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Food Crops and Poultry

Food crops and poultry raised in the vicinity of BLN are sampled annually as they become available during the growing season. During this sampling period samples of cabbage, corn, green beans, and tomatoes were collected and analyzed for specific gamma-emitting radionuclides. No sample of poultry was taken during this reporting period. The results are given in tables 16 through 19.

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TABLE 10

RADIOACTIVITY IN MILK

PCI/L - 0.037 BQ/L

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION [a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE [b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE [b]	CONTROL LOCATIONS MEAN (F) [b] RANGE [b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI) 18						
CS-137	10.000	15.16(5/ 8) 11.30- 24.10	SISK FARM 4.9 MILES SW	15.16(5/ 8) 11.30- 24.10	10 VALUES <LLD	
K-40	150.000	1233.49(8/ 8) 1142.40- 1371.50	SISK FARM 4.9 MILES SW	1233.49(8/ 8) 1142.40- 1371.50	1395.62(10/ 10) 1252.10- 1591.20	
IODINE-131 25	0.500	12 VALUES <LLD ANALYSIS PERFORMED			13 VALUES <LLD	
GAMMA (GELI) 5						
CS-137	5.000	14.67(5/ 5) 7.71- 22.71	SISK FARM 4.9 MILES SW	14.67(5/ 5) 7.71- 22.71	3 VALUES <LLD	
K-40	NOT ESTAB	1276.58(5/ 5) 1177.28- 1438.80	SISK FARM 4.9 MILES SW	1276.58(5/ 5) 1177.28- 1438.80	1341.69(3/ 3) 1244.22- 1411.25	
PB-214	NOT ESTAB	10.44(1/ 5) 10.44- 10.44	SISK FARM 4.9 MILES SW	10.44(1/ 5) 10.44- 10.44	3 VALUES <LLD	
PB-212	NOT ESTAB	4.60(1/ 5) 4.60- 4.60	SISK FARM 4.9 MILES SW	4.60(1/ 5) 4.60- 4.60	2.39(2/ 3) 1.88- 2.91	
TL-208	NOT ESTAB	5.41(1/ 5) 5.41- 5.41	SISK FARM 4.9 MILES SW	5.41(1/ 5) 5.41- 5.41	3 VALUES <LLD	
SR 89 25	10.000	12 VALUES <LLD ANALYSIS PERFORMED			13 VALUES <LLD	
SR 90 25	2.000	15.06(12/ 12) 4.44- 21.50	SISK FARM 4.9 MILES SW	15.06(12/ 12) 4.44- 21.50	4.63(13/ 13) 3.36- 11.48	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 11

RADIOACTIVITY IN VEGETATION

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED GAMMA (GELI)	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CE-144	0.220	0.69(6/ 36)	PM2 HOLLYWOOD,AL	1.53(1/ 4)	0.35(2/ 12)	
		0.29- 1.53	1.8 MILES WNW	1.53- 1.53	0.23- 0.48	
RU-106	0.510	0.59(1/ 36)	PM2 HOLLYWOOD,AL	0.59(1/ 4)	12 VALUES <LLD	
		0.59- 0.59	1.8 MILES WNW	0.59- 0.59		
CS-137	0.060	0.11(13/ 36)	SISK FARM	0.22(1/ 4)	0.08(2/ 12)	
		0.07- 0.26	4.9 MILES SW	0.22- 0.22	0.07- 0.08	
NB-95	0.050	0.13(2/ 36)	PM2 HOLLYWOOD,AL	0.15(1/ 4)	12 VALUES <LLD	
		0.11- 0.15	1.8 MILES WNW	0.15- 0.15		
K-40	NOT ESTAB	9.76(35/ 36)	PM1 SCOTTSBORO,A	11.62(4/ 4)	8.93(12/ 12)	
		1.36- 29.02	5.6 MILES WSW	2.29- 19.40	1.75- 21.93	
MN-54	0.050	0.06(1/ 36)	PM2 HOLLYWOOD,AL	0.06(1/ 4)	12 VALUES <LLD	
		0.06- 0.06	1.8 MILES WNW	0.06- 0.06		
BI-214	0.100	0.25(3/ 36)	LM2 BL ENV DATA	0.40(1/ 4)	0.15(2/ 12)	
		0.17- 0.40	1.0 MILE NE	0.40- 0.40	0.11- 0.20	
BI-212	NOT ESTAB	0.55(1/ 36)	LM2 BL ENV DATA	0.55(1/ 4)	12 VALUES <LLD	
		0.55- 0.55	1.0 MILE NE	0.55- 0.55		
PB-214	NOT ESTAB	0.12(11/ 36)	LM2 BL ENV DATA	0.47(1/ 4)	0.08(4/ 12)	
		0.00- 0.47	1.0 MILE NE	0.47- 0.47	0.03- 0.14	
PB-212	NOT ESTAB	0.06(24/ 36)	LM2 BL ENV DATA	0.13(4/ 4)	0.05(8/ 12)	
		0.00- 0.46	1.0 MILE NE	0.01- 0.46	0.01- 0.10	
BE-7	NOT ESTAB	7.48(36/ 36)	LM1 BL SOUTHWEST	10.52(4/ 4)	9.01(12/ 12)	
		1.03- 17.37	0.8 MILE SW	6.75- 14.44	1.33- 18.34	
TL-208	NOT ESTAB	0.04(16/ 36)	LM2 BL ENV DATA	0.07(4/ 4)	0.01(6/ 12)	
		0.00- 0.17	1.0 MILE NE	0.02- 0.17	0.00- 0.03	
AC-228	NOT ESTAB	0.15(12/ 36)	LM2 BL ENV DATA	0.57(1/ 4)	0.09(5/ 12)	
		0.02- 0.57	1.0 MILE NE	0.57- 0.57	0.01- 0.19	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 12

RADIOACTIVITY IN SOIL

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI) 20						
CS-137	0.020	0.21(16/ 16)	PM4 STEVENSON,AL	0.45(2/ 2)	0.22(4/ 4)	
		0.03- 0.50	11.0 MILES NNE	0.39- 0.50	0.10- 0.45	
K-40	0.250	5.30(16/ 16)	LM1 BL SOUTHWEST	9.24(2/ 2)	2.67(4/ 4)	
		1.10- 10.20	0.6 MILE SW	8.41- 10.07	2.06- 3.17	
MN-54	0.010	0.03(1/ 16)	PM1 SCOTTSBORO,A	0.03(1/ 2)	0.01(1/ 4)	
		0.03- 0.03	5.6 MILES WSW	0.03- 0.03	0.01- 0.01	
BI-214	0.050	0.95(16/ 16)	LM2 BL ENV DATA	1.11(2/ 2)	0.69(4/ 4)	
		0.34- 1.16	1.0 MILE NE	1.06- 1.16	0.51- 1.10	
BI-212	0.100	1.32(16/ 16)	LM2 BL ENV DATA	1.77(2/ 2)	0.68(4/ 4)	
		0.36- 1.81	1.0 MILE NE	1.73- 1.81	0.66- 0.69	
PB-214	0.050	1.03(16/ 16)	LM2 BL ENV DATA	1.23(2/ 2)	0.73(4/ 4)	
		0.36- 1.29	1.0 MILE NE	1.16- 1.29	0.53- 1.16	
PB-212	NOT ESTAB	1.13(16/ 16)	.1 BL SOUTHWEST	1.48(2/ 2)	0.55(4/ 4)	
		0.31- 1.67	.8 MILE SW	1.30- 1.67	0.48- 0.61	
RA-226	0.050	0.95(16/ 16)	LM2 BL ENV DATA	1.11(2/ 2)	0.69(4/ 4)	
		0.34- 1.16	1.0 MILE NE	1.06- 1.16	0.51- 1.10	
RA-223	NOT ESTAB	0.32(9/ 16)	LM2 BL ENV DATA	0.51(1/ 2)	4 VALUES <LLD	
		0.19- 0.51	1.0 MILE NE	0.51- 0.51		
RA-224	NOT ESTAB	1.17(6/ 16)	PM1 SCOTTSBORO,A	1.65(1/ 2)	0.63(1/ 4)	
		0.38- 1.65	5.6 MILES WSW	1.65- 1.65	0.63- 0.63	
TL-208	0.020	0.36(16/ 16)	LM1 BL SOUTHWEST	0.46(2/ 2)	0.19(4/ 4)	
		0.10- 0.46	0.8 MILE SW	0.45- 0.46	0.17- 0.20	
AC-228	0.060	1.12(16/ 16)	LM1 BL SOUTHWEST	1.43(2/ 2)	0.55(4/ 4)	
		0.32- 1.49	0.8 MILE SW	1.37- 1.49	0.52- 0.60	
PA-234M	NOT ESTAB	2.90(7/ 16)	PM1 SCOTTSBORO,A	3.32(2/ 2)	1.99(1/ 4)	
		2.34- 3.75	5.6 MILES WSW	2.90- 3.75	1.99- 1.99	
SR 89	1.500	16 VALUES <LLD			4 VALUES <LLD	
20		ANALYSIS PERFORMED				
SR 90	0.300	16 VALUES <LLD			4 VALUES <LLD	
20		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 13

RADIOACTIVITY IN WELL WATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY BELLEFONTE
LOCATION OF FACILITY JACKSON ALABAMA

DOCKET NO. 50-438,439
REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI) 54						
FE-59	NOT ESTAB	5.10(2/ 44) 4.80- 5.40	WELL #5 ONSITE NNE	5.40(1/ 6) 5.40- 5.40	6.60(1/ 20) 6.60- 6.60	
GAMMA (GELI) 26						
K-40	NOT ESTAB	19.66(4/ 22) 6.29- 31.19	WELL #2 ONSITE WSW	31.19(1/ 5) 31.19- 31.19	1.03(2/ 6) 0.53- 1.52	
BI-214	NOT ESTAB	23.54(11/ 22) 0.01- 121.93	WELL #5 ONSITE NNE	45.66(3/ 4) 4.29- 121.93	18.11(4/ 6) 0.61- 40.27	
PB-214	NOT ESTAB	26.70(7/ 22) 5.33- 71.33	WELL #2 ONSITE WSW	39.05(2/ 5) 6.76- 71.33	24.92(3/ 6) 19.62- 35.00	
PB-212	NOT ESTAB	2.19(11/ 22) 0.12- 6.88	WELL #3 ONSITE NW	3.79(3/ 4) 2.06- 6.88	2.53(2/ 6) 1.48- 3.58	
TL-208	NOT ESTAB	0.91(10/ 22) 0.02- 3.03	WELL #2 ONSITE WSW	1.52(2/ 5) 0.02- 3.03	1.71(4/ 6) 0.04- 2.94	
AC-228	NOT ESTAB	22 VALUES <LLD			0.46(2/ 6) 0.43- 0.50	
TRITIUM 32	330.000	24 VALUES <LLD ANALYSIS PERFORMED			8 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 14

RADIOACTIVITY IN PUBLIC WATER SUPPLY

PCI/L - 0.037 BQ/L

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	2.400	3.10(17/ 39)	SCOTTSBORO,AL	3.30(7/ 13)	2.68(3/ 13)	
52		2.45- 5.05	TRM 385.8	2.59- 5.05	2.42- 2.86	
GAMMA (NAI)						
41						
FE-59	NOT ESTAB	5.67(4/ 30)	HOLLYWOOD,AL	5.70(1/ 9)	1.30(1/ 11)	
		2.20- 9.40	3.4 MILES WNW	5.70- 5.70	1.30- 1.30	
GAMMA (GELI)						
11						
K-40	NOT ESTAB	63.45(2/ 9)	HOLLYWOOD,AL	86.83(1/ 4)	2 VALUES <LLD	
		40.07- 86.83	3.4 MILES WNW	86.83- 86.83		
BI-214	NOT ESTAB	22.93(2/ 9)	HOLLYWOOD,AL	22.93(2/ 4)	5.33(1/ 2)	
		8.28- 37.58	3.4 MILES WNW	9.28- 37.58	5.33- 5.33	
PB-214	NOT ESTAB	37.99(1/ 9)	HOLLYWOOD,AL	37.99(1/ 4)	2 VALUES <LLD	
		37.99- 37.99	3.4 MILES WNW	37.99- 37.99		
PB-212	NOT ESTAB	0.10(1/ 9)	SCOTTSBORO,AL	0.10(1/ 2)	2 VALUES <LLD	
		0.10- 0.10	TRM 385.8	0.10- 0.10		
TL-208	NOT ESTAB	0.44(1/ 9)	HOLLYWOOD,AL	0.44(1/ 4)	2 VALUES <LLD	
		0.44- 0.44	3.4 MILES WNW	0.44- 0.44		
AC-228	NOT ESTAB	3.56(1/ 9)	HOLLYWOOD,AL	3.56(1/ 4)	2 VALUES <LLD	
		3.56- 3.56	3.4 MILES WNW	3.56- 3.56		
SR 89	10.000	11.48(1/ 12)	SAND MT. WFPA	11.48(1/ 4)	4 VALUES <LLD	
16		11.48- 11.48	TRM 382.1	11.48- 11.48		
SR 90	2.000	12 VALUES <LLD			4 VALUES <LLD	
16		ANALYSIS PERFORMED				
TRITIUM	330.000	342.53(1/ 12)	SAND MT. WFPA	342.53(1/ 4)	4 VALUES <LLD	
16		342.53- 342.53	TRM 382.1	342.53- 342.53		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

Table 15

ENVIRONMENTAL GAMMA RADIATION LEVELS

Average External Gamma Radiation Levels at Various Distances from Bellefonte Nuclear Plant for Each Quarter - 1982
mR/Quarter[a]

Distance miles	Average External Gamma Radiation Levels[b]			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
0-1	18.4 ± 1.2	19.2 ± 1.8	20.3 ± 1.2	18.6 ± 3.6
1-2	21.4 ± 5.0	23.0 ± 6.6	23.3 ± 6.5	23.5 ± 8.6
2-4	15.3 ± 0.9	15.5 ± 1.1	15.4 ± 1.5	13.3 ± 1.6
4-6	16.4 ± 1.5	17.1 ± 1.5	17.6 ± 1.8	15.1 ± 2.9
>6	15.5 ± 1.7	15.4 ± 1.1	16.0 ± 1.3	13.1 ± 1.0
Average, 0-2 miles (Onsite)	18.9 ± 2.4	19.9 ± 3.3	20.8 ± 2.9	19.5 ± 4.9
Average, >2 miles (Offsite)	16.0 ± 1.5	16.4 ± 1.5	16.7 ± 1.9	14.3 ± 2.5

a. Data normalized to one quarter (2190 hours).
b. All averages reported ±1σ (68 percent confidence level).

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TABLE 16

RADIOACTIVITY IN CABBAGE

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BELLEFONTE
LOCATION OF FACILITY JACKSON ALABAMA

DOCKET NO. 50-438,439
REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI)						
K-40	NOT ESTAB	1794.30(1/ 1) 1794.30- 1794.30	2 MILES WNW 2 MILES WNW	1794.30(1/ 1) 1794.30- 1794.30	1877.20(1/ 1) 1877.20- 1877.20	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 17

RADIOACTIVITY IN CORN

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED GAMMA (GELI)	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
K-40	NOT ESTAB	2257.95(1/ 1) 2257.95- 2257.95	2 MILES WNW 2 MILES WNW	2257.95(1/ 1) 2257.95- 2257.95	2197.19(1/ 1) 2197.19- 2197.19	
PB-212	NOT ESTAB	5.89(1/ 1) 5.89- 5.89	2 MILES WNW 2 MILES WNW	5.89(1/ 1) 5.89- 5.89	1 VALUES <LLD	
TL-208	NOT ESTAB	2.71(1/ 1) 2.71- 2.71	2 MILES WNW 2 MILES WNW	2.71(1/ 1) 2.71- 2.71	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 18

RADIOACTIVITY IN GREEN BEANS

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI) 2						
K-40	NOT ESTAB	1679.35(1/ 1) 1679.35- 1679.35	2 MILES WNW 2 MILES WNW	1679.35(1/ 1) 1679.35- 1679.35	1886.15(1/ 1) 1886.15- 1886.15	
PB-212	NOT ESTAB	5.46(1/ 1) 5.49- 5.48	2 MILES WNW 2 MILES WNW	5.48(1/ 1) 5.48- 5.48	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 19

RADIOACTIVITY IN TOMATOES

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI)						
K-40	NOT ESTAB	2522.82(1/ 1) 2522.82- 2522.82	2 MILES WNW	2522.82(1/ 1) 2522.82- 2522.82	2267.26(1/ 1) 2267.26- 2267.26	
RA-212	NOT ESTAB	0.64(1/ 1) 0.64- 0.64	2 MILES WNW 2 MILES WNW	0.64(1/ 1) 0.64- 0.64	0.19(1/ 1) 0.19- 0.19	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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Figure 5

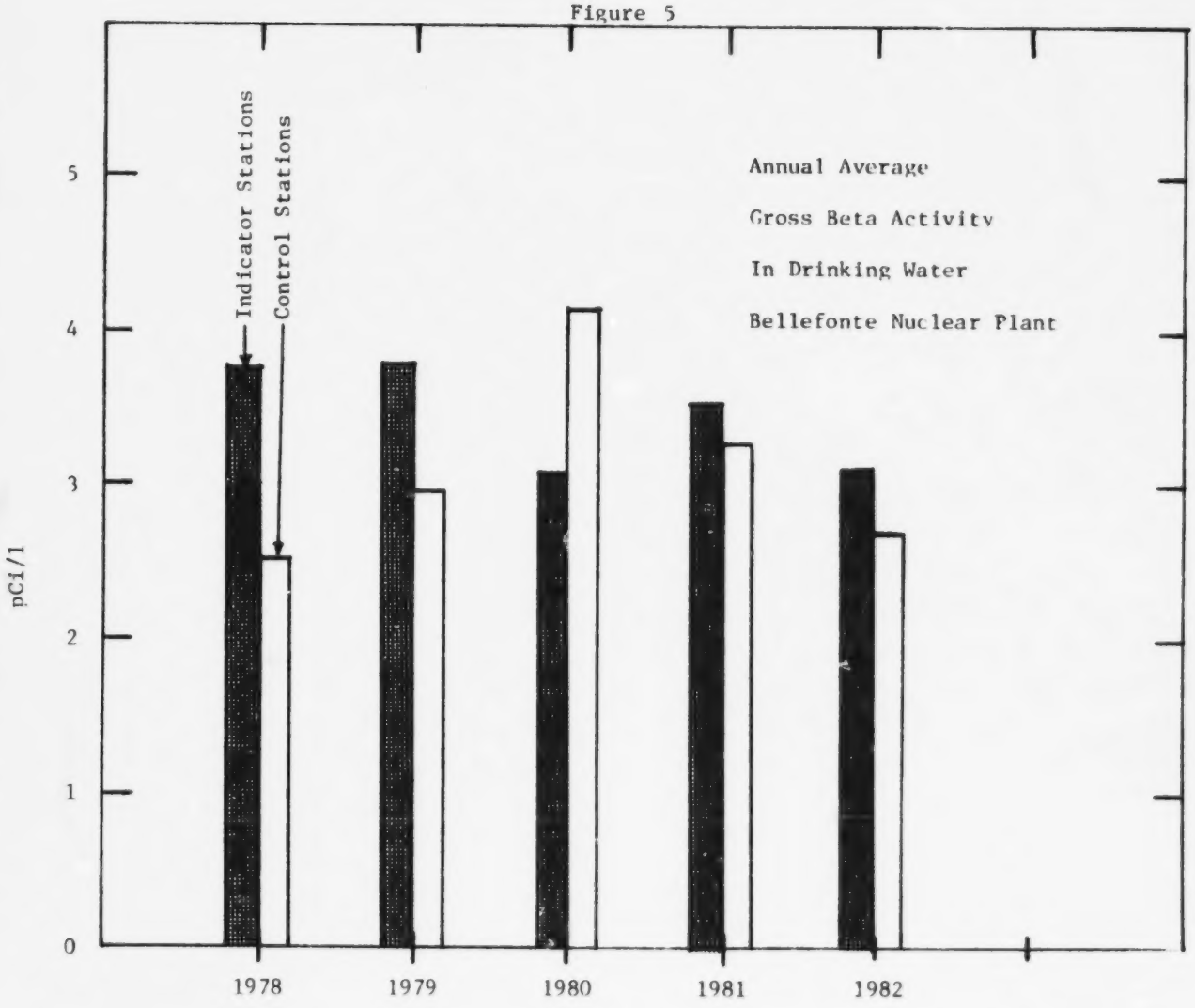

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Figure 6

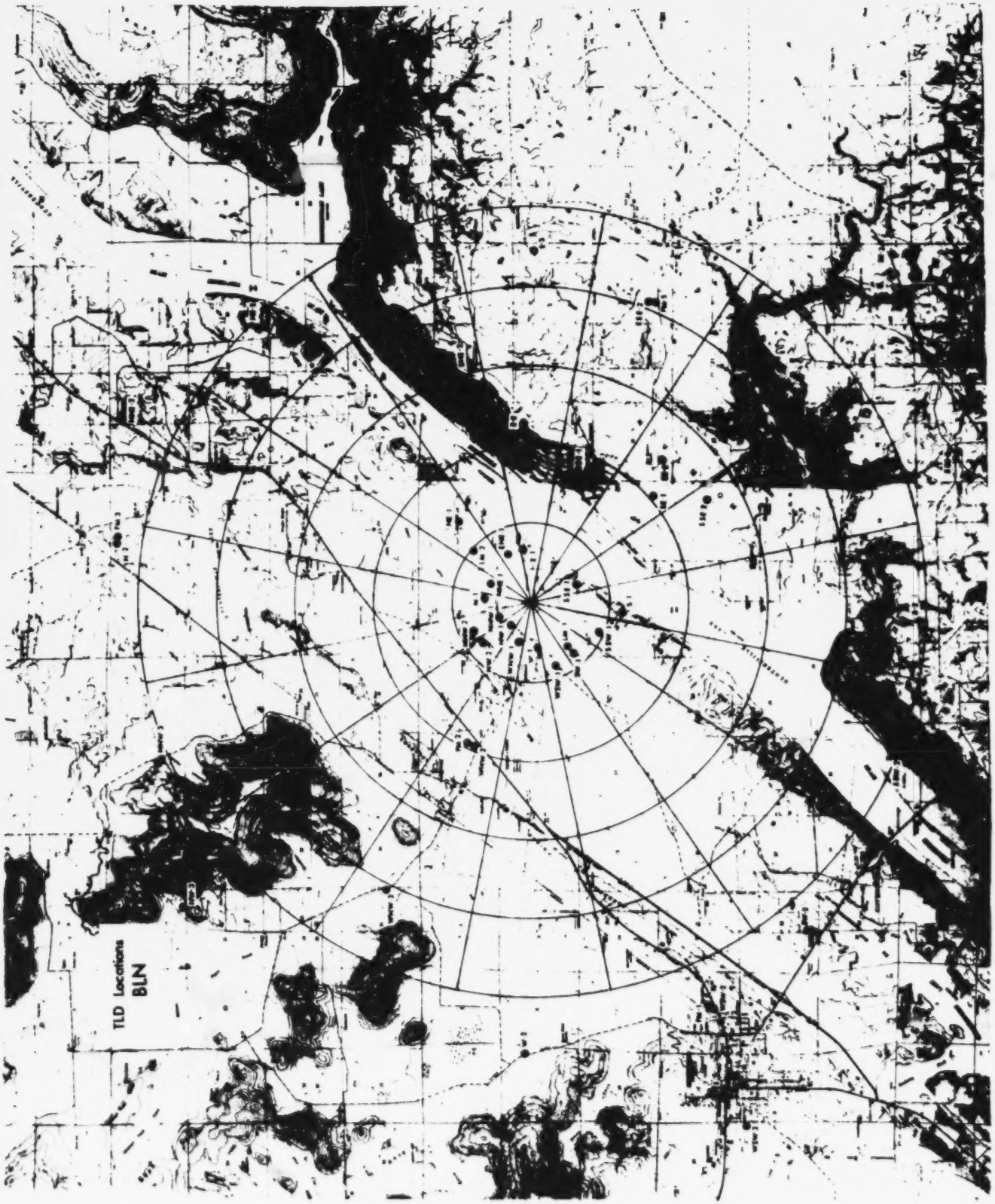

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Figure 7

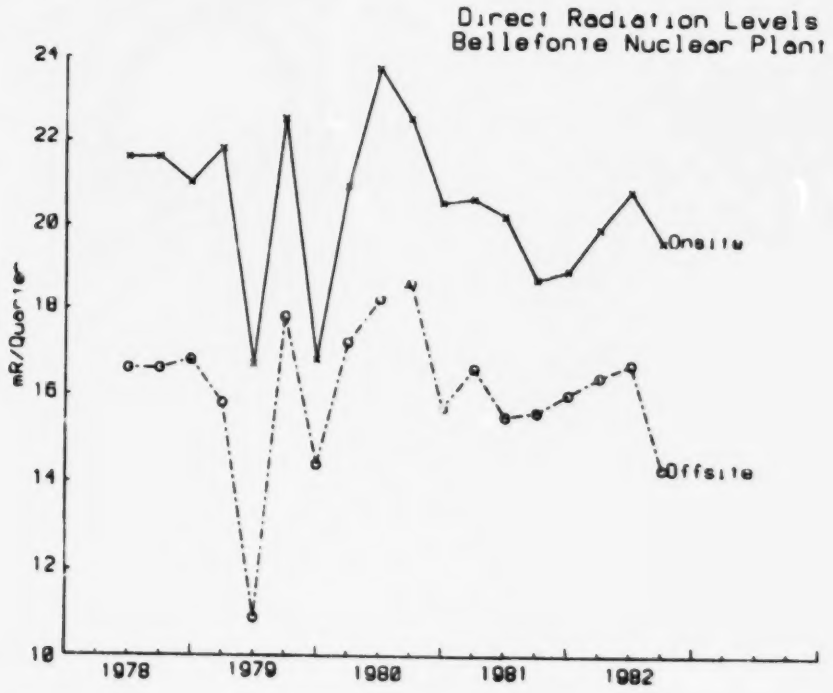
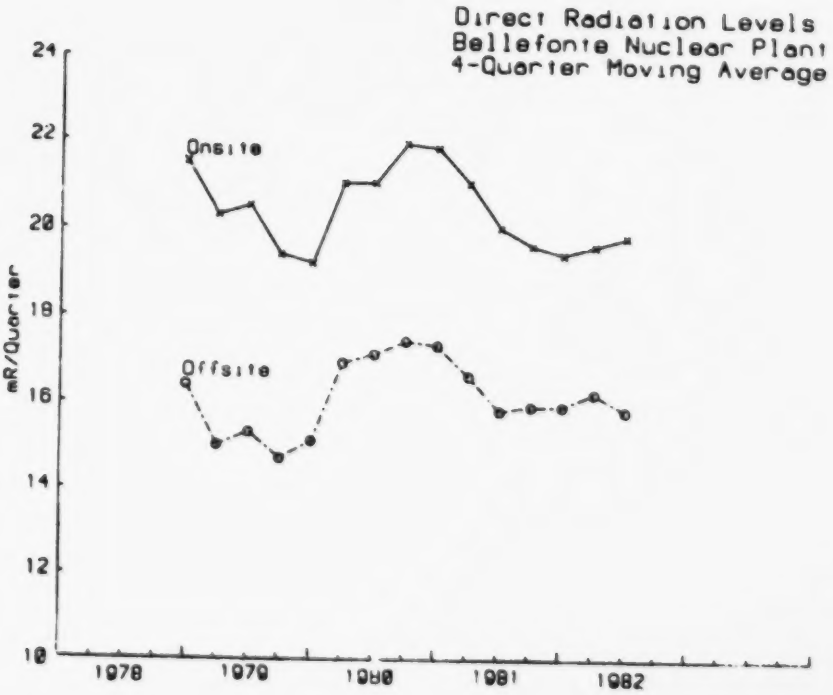


Figure 8



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Reservoir Monitoring

Reservoir sampling at BLN was initiated in November 1981 with the collection of surface water. Surface water samples were collected quarterly and samples of sediment, Asiatic clams, plankton, and aquatic macrophytes were collected semiannually beginning in the spring of 1982 (table 20). Because of the location of BLN between Browns Ferry Nuclear Plant (BFN) and Sequoyah Nuclear Plant (SQN), the reservoirs scheduled to be sampled for fish were being sampled in the BFN and SQN monitoring programs.

Water

Grab samples of surface water are taken quarterly at TRMs 388.0, 391.2, and 396.8 (figure 9) and analyzed for gamma-emitting radionuclides strontium, and for tritium. The results are shown in table 21.

Fish

Radiological monitoring for fish is accomplished by analyses of composite samples of adult fish taken from each of three contiguous reservoirs--the reservoir on which the plant is located and the reservoirs immediately upstream and downstream. No permanent sampling stations are established within each reservoir; this reflects the movement of fish species within reservoirs as determined by TVA data from the Brown Ferry Nuclear Plant preoperational monitoring program. Sufficient fish are collected in each reservoir to yield 250-300 grams oven-dry material for analytical purposes. The composite samples contain approximately the same quantity of flesh from each fish. For each composite, a subsample of material is drawn for analysis.

Samples of white crappie and smallmouth buffalo are taken semiannually from Guntersville and Wheeler Reservoirs and analyzed for gamma-emitting radionuclides and strontium as a part of the BFN monitoring program. In the SQN monitoring program, samples of white crappie and smallmouth buffalo are taken semiannually from Nickajack Reservoir and analyzed for gross beta and gamma-emitting radionuclides. In addition, ^{89}Sr and ^{90}Sr concentrations are determined in one smallmouth buffalo flesh sample and in two whole smallmouth buffalo samples. The data from the analysis of these samples are included herein in tables 22, 23, and 24.

Sediment

Sediment samples are collcted from Ponar dredge hauls made for bottom fauna. Gamma radioactivity and ^{89}Sr and ^{90}Sr content are determined semiannually in composite samples collected from each of three stations. Locations of these stations are shown in table 20. Results are shown in table 25.

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Plankton

Net plankton (all phytoplankton and zooplankton caught with a 100 μ mesh net) are collected for radiological analyses at each of three stations by vertical tows with a 1/2-meter net. At least 50 grams (wet weight) of material is necessary for analytical accuracy. Samples are collected semiannually and submitted for gross beta analysis, and when quantities are sufficient, for gamma activity and ^{89}Sr and ^{90}Sr content. During this reporting period, all six samples contained insufficient volume of material for gross beta, strontium, or gamma analyses.

Bottom Fauna

The flesh and shells of Asiatic clams collected semiannually from the cross sections at three stations (table 20) are analyzed for gamma-emitting radionuclides. Levels of ^{89}Sr and ^{90}Sr are determined on the shells, and on the flesh when sufficient amounts were available. A 50-gram (wet weight) sample provides sufficient activity for counting. During this reporting period, three samples of clam flesh contained insufficient volume for analysis. Results are given in tables 26 and 27.

Aquatic Macrophytes

Samples of aquatic macrophytes are collected semiannually from three locations (table 20) and analyzed for gross beta gamma-emitting radionuclides and levels of ^{89}Sr and ^{90}Sr. Results are given in table 28.

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Table 20

Sampling Schedule - Reservoir Monitoring

Tennessee River (Mile)	Biological Samples					
	Plankton	Benthic Fauna	Sediment	Fish*	Aquatic Macrophytes	Surface Water
396.8 (control)	X	X	X		X	X
391.2	X	X	X		X	X
388.0	X	X	X		X	X

*Fish samples are taken from Watts Bar, Chickamauga, and Nickajack Reservoirs.

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TABLE 21

RADIOACTIVITY IN SURFACE WATER TOTAL

PCI/L - 0.037 BQ/L

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI)						
6		6 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	
GAMMA (GELI)						
4						
K-40	NOT ESTAB	2 VALUES <LLD			20.14(1/ 2) 20.14- 20.14	
BI-214	NOT ESTAB	2.62(1/ 2) 2.62- 2.62	TRM 391.2	2.62(1/ 1) 2.62- 2.62	4.93(2/ 2) 3.22- 6.63	
PB-214	NOT ESTAB	2.25(1/ 2) 2.25- 2.25	TRM 391.2	2.25(1/ 1) 2.25- 2.25	2 VALUES <LLD	
PB-212	NOT ESTAB	2 VALUES <LLD			2.60(1/ 2) 2.60- 2.60	
SR 89	10.000	5 VALUES <LLD			4 VALUES <LLD	
12		ANALYSIS PERFORMED				
SR 90	2.000	5 VALUES <LLD			4 VALUES <LLD	
12		ANALYSIS PERFORMED				
TRITIUM	330.000	359.93(4/ 8)	TRM 391.2	372.77(2/ 4)	335.04(1/ 4)	
12		334.42- 399.75		367.21- 378.34	335.04- 335.04	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 22

RADIOACTIVITY IN WHITE CRAPPIE (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100				1.38(2/ 2) 0.31- 2.44	
GROSS BETA	0.100	33.25(4/ 4) 24.33- 41.19	WHEELER RES TRM 275-349	33.73(2/ 2) 30.79- 36.67	31.69(2/ 2) 31.11- 32.27	
GAMMA (GELI)						
CS-137	0.020	0.13(4/ 4) 0.10- 0.16	GUNTERSVILLE RES TRM 349-425	0.13(2/ 2) 0.10- 0.16	0.11(2/ 2) 0.09- 0.13	
K-40	NOT ESTAB	15.15(4/ 4) 13.45- 16.86	WHEELER RES TRM 275-349	15.95(2/ 2) 15.04- 16.86	18.62(2/ 2) 17.63- 19.60	
PB-214	NOT ESTAB	4 VALUES <LLD			0.01(2/ 2) 0.00- 0.01	
PB-212	NOT ESTAB	0.01(3/ 4) 0.01- 0.01	GUNTERSVILLE RES TRM 349-425	0.01(1/ 2) 0.01- 0.01	2 VALUES <LLD	
RA-226	NOT ESTAB	0.02(2/ 4) 0.02- 0.02	WHEELER RES TRM 275-349	0.02(2/ 2) 0.02- 0.02	0.00(1/ 2) 0.00- 0.00	
PA-234M	NOT ESTAB	4 VALUES <LLD			2.82(1/ 2) 2.82- 2.82	
SR 89	0.500				1.13(2/ 2) 0.80- 1.47	
SR 90	0.100	0 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 23

RADIOACTIVITY IN SMALLMOUTH BUFFALO (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100				1.07(2/ 2) 0.81- 1.34	
GROSS BETA	0.100	23.50(4/ 4) 19.76- 29.21	WHEELER RES TRM 275-349	24.48(2/ 2) 19.76- 29.21	25.21(2/ 2) 16.96- 33.45	
GAMMA (GELI)						
CS-137	0.020	0.06(4/ 4) 0.04- 0.09	GUNTERSVILLE RES TRM 349-425	0.07(2/ 2) 0.06- 0.09	0.04(2/ 2) 0.02- 0.07	
K-40	NOT ESTAB	10.61(4/ 4) 9.20- 12.69	WHEELER RES TRM 275-349	11.65(2/ 2) 10.60- 12.69	11.04(2/ 2) 8.46- 13.63	
BI-214	0.020	4 VALUES <LLD			0.02(1/ 2) 0.02- 0.02	
PB-214	NOT ESTAB	0.01(1/ 4) 0.01- 0.01	WHEELER RES TRM 275-349	0.01(1/ 2) 0.01- 0.01	0.01(1/ 2) 0.01- 0.01	
PB-212	NOT ESTAB	0.02(1/ 4) 0.02- 0.02	WHEELER RES TRM 275-349	0.02(1/ 2) 0.02- 0.02	2 VALUES <LLD	
BE-7	NOT ESTAB	0.32(1/ 4) 0.32- 0.32	WHEELER RES TRM 275-349	0.32(1/ 2) 0.32- 0.32	2 VALUES <LLD	
SR-89	0.500	2 VALUES <LLD			1.13(1/ 2) 1.13- 1.13	
SR-90	0.100	2 VALUES <LLD			2 VALUES <LLD	
		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthases (F).

TABLE 24

RADIOACTIVITY IN SMALLMOUTH BUFFALO (WHOLE)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100				0.90(1/ 2) 0.90- 0.90	
GROSS BETA	0.100	18.91(4/ 4) 16.91- 20.43	WHEELER RES TRM 275-349	20.13(2/ 2) 19.83- 20.43	14.31(2/ 2) 14.29- 14.33	
GAMMA (GELI)						
CS-137	0.020	0.03(4/ 4) 0.02- 0.04	GUNTERSVILLE RES TRM 349-425	0.04(2/ 2) 0.03- 0.04	0.04(2/ 2) 0.03- 0.04	
K-40	NOT ESTAB	7.03(4/ 4) 5.42- 7.79	WHEELER RES TRM 275-349	7.68(2/ 2) 7.56- 7.79	8.08(2/ 2) 6.72- 9.44	
BI-214	0.020	0.08(2/ 4) 0.04- 0.12	WHEELER RES TRM 275-349	0.12(1/ 2) 0.12- 0.12	0.02(1/ 2) 0.02- 0.02	
PB-214	NOT ESTAB	0.02(1/ 4) 0.02- 0.02	WHEELER RES TRM 275-349	0.02(1/ 2) 0.02- 0.02	0.03(1/ 2) 0.03- 0.03	
TH-212	NOT ESTAB	0.01(4/ 4) 0.01- 0.03	WHEELER RES TRM 275-349	0.02(2/ 2) 0.01- 0.03	2 VALUES <LLD	
RA-226	NOT ESTAB	0.03(2/ 4) 0.04- 0.12	WHEELER RES TRM 275-349	0.12(1/ 2) 0.12- 0.12	0.02(1/ 2) 0.02- 0.02	
SR 89	0.500				0.81(2/ 2) 0.68- 0.94	
SR 90	0.100	0 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 25

RADIOACTIVITY IN SEDIMENT

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED GAMMA (GELI)	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
6						
CE-144	0.060	0.24(2/ 4) 0.12- 0.36	TRM 348.0	0.36(1/ 2) 0.36- 0.36	2 VALUES <LLD	
CO-60	0.010	0.12(4/ 4) 0.09- 0.15	TRM 348.0	0.13(2/ 2) 0.10- 0.15	0.08(2/ 2) 0.06- 0.10	
CS-137	0.020	1.56(4/ 4) 0.74- 2.84	TRM 391.2	1.95(2/ 2) 1.07- 2.84	1.21(2/ 2) 0.24- 2.17	
K-40	NOT ESTAB	15.23(4/ 4) 14.14- 16.25	TRM 348.0	15.45(2/ 2) 14.66- 16.25	15.97(2/ 2) 13.39- 18.55	
MN-54	0.010	0.03(1/ 4) 0.03- 0.03	TRM 348.0	0.03(1/ 2) 0.03- 0.03	2 VALUES <LLD	
BI-214	0.020	1.26(4/ 4) 1.17- 1.39	TRM 391.2	1.32(2/ 2) 1.25- 1.39	1.20(2/ 2) 0.97- 1.43	
BI-212	0.100	1.71(4/ 4) 1.59- 2.01	TRM 348.0	1.81(2/ 2) 1.61- 2.01	1.90(2/ 2) 1.47- 2.34	
PB-214	NOT ESTAB	1.39(4/ 4) 1.33- 1.50	TRM 391.2	1.43(2/ 2) 1.36- 1.50	1.35(2/ 2) 1.05- 1.65	
PB-212	NOT ESTAB	1.59(4/ 4) 1.49- 1.71	TRM 391.2	1.61(2/ 2) 1.50- 1.71	1.64(2/ 2) 1.32- 1.96	
RA-226	NOT ESTAB	1.26(4/ 4) 1.17- 1.39	TRM 391.2	1.32(2/ 2) 1.25- 1.39	1.20(2/ 2) 0.97- 1.43	
RA-223	NOT ESTAB	0.34(1/ 4) 0.34- 0.34	TRM 348.0	0.34(1/ 2) 0.34- 0.34	0.43(1/ 2) 0.43- 0.43	
RA-224	NOT ESTAB	1.73(4/ 4) 1.49- 1.91	TRM 348.0	1.82(2/ 2) 1.73- 1.91	1.84(1/ 2) 1.84- 1.84	
BE-7	NOT ESTAB	0.67(1/ 4) 0.67- 0.67	TRM 348.0	0.67(1/ 2) 0.67- 0.67	2 VALUES <LLD	
TL-208	0.020	0.51(4/ 4) 0.46- 0.56	TRM 391.2	0.52(2/ 2) 0.48- 0.56	0.50(2/ 2) 0.39- 0.61	
AC-228	0.060	1.55(4/ 4) 1.48- 1.64	TRM 348.0	1.57(2/ 2) 1.50- 1.64	1.53(2/ 2) 1.10- 1.96	
PA-234M	NOT ESTAB	3.13(1/ 4) 3.13- 3.13	TRM 348.0	3.13(1/ 2) 3.13- 3.13	2 VALUES <LLD	
SR 89	1.500	2.04(1/ 4) 2.04- 2.04	TRM 348.0	2.04(1/ 2) 2.04- 2.04	1.68(1/ 2) 1.68- 1.68	
SR 90	0.300	0.39(1/ 4) 0.39- 0.39	TRM 348.0	0.39(1/ 2) 0.39- 0.39	2 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 26

RADIOACTIVITY IN CLAM FLESH

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY HELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1962

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.100	8.33(2/ 2) 5.56- 13.10	TRM 388.0	13.10(1/ 1) 13.10- 13.10	7.76(1/ 1) 7.76- 7.76	
GAMMA (GELI)						
K-40	NOT ESTAB	5.36(2/ 2) 4.80- 5.92	TRM 388.0	5.92(1/ 1) 5.92- 5.92	3.84(1/ 1) 3.84- 3.84	
BI-214	NOT ESTAB	1.05(2/ 2) 0.20- 1.89	TRM 388.0	1.89(1/ 1) 1.89- 1.89	0.52(1/ 1) 0.52- 0.52	
PB-214	NOT ESTAB	0.62(1/ 2) 0.62- 0.62	TRM 388.0	0.62(1/ 1) 0.62- 0.62	1 VALUES <LLD	
PB-212	NOT ESTAB	0.29(1/ 2) 0.29- 0.29	TRM 388.0	0.29(1/ 1) 0.29- 0.29	1 VALUES <LLD	
RA-226	NOT ESTAB	1.05(2/ 2) 0.20- 1.89	TRM 388.0	1.89(1/ 1) 1.89- 1.89	1 VALUES <LLD	
TL-208	NOT ESTAB	0.17(1/ 2) 0.17- 0.17	TRM 388.0	0.17(1/ 1) 0.17- 0.17	0.01(1/ 1) 0.01- 0.01	
AC-228	NOT ESTAB	0.35(1/ 2) 0.35- 0.35	TRM 381.2	0.35(1/ 1) 0.35- 0.35	0.50(1/ 1) 0.50- 0.50	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 27

RADIOACTIVITY IN CLAM SHELL

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439

LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI)[b]						
K-40	NOT ESTAB	0.72(1/ 4) 0.72- 0.72	TRM 391.2	0.72(1/ 2) 0.72- 0.72	0.06(1/ 2) 0.06- 0.06	
BI-214	0.050	0.27(2/ 4) 0.19- 0.35	TRM 391.2	0.35(1/ 2) 0.35- 0.35	0.33(1/ 2) 0.33- 0.33	
PB-214	0.050	0.36(2/ 4) 0.25- 0.47	TRM 391.2	0.48(1/ 2) 0.48- 0.48	0.42(1/ 2) 0.42- 0.42	
PB-212	NOT ESTAB	0.06(2/ 4) 0.02- 0.09	TRM 346.0	0.09(1/ 2) 0.09- 0.09	2 VALUES <LLD	
RA-226	0.050	0.19(1/ 4) 0.19- 0.19	TRM 346.0	0.19(1/ 2) 0.19- 0.19	0.33(1/ 2) 0.33- 0.33	
TL-208	0.020	0.04(1/ 4) 0.04- 0.04	TRM 346.0	0.04(1/ 2) 0.04- 0.04	2 VALUES <LLD	
AC-228	0.060	0.19(1/ 4) 0.19- 0.19	TRM 346.0	0.19(1/ 2) 0.19- 0.19	2 VALUES <LLD	
SR 89	5.000	4 VALUES <LLD			2 VALUES <LLD	
SR 90[c]	1.000	ANALYSIS PERFORMED 1.36(4/ 4) 1.03- 2.05	TRM 388.0	1.54(2/ 2) 1.03- 2.05	1.37(2/ 2) 1.01- 1.73	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 28

RADIOACTIVITY IN AQUATIC MACROPHYTES

PCI/GM - 0.037 BQ/GM

NAME OF FACILITY BELLEFONTE — DOCKET NO. 50-438,439
LOCATION OF FACILITY JACKSON ALABAMA — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]		CONTROL LOCATIONS MEAN (F)[b] RANGE[b]		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	NOT ESTAB	17.76(4/ 4)		TRM 388.0	17.42(2/ 2)		12.77(2/ 2)		
		13.96-	20.87		13.96-	20.87	9.13-	16.41	
GAMMA (GELI)									
CO-60	NOT ESTAB	0.07(2/ 4)		TRM 388.0	0.07(1/ 2)		0.04(2/ 2)		
		0.07-	0.07		0.07-	0.07	0.04-	0.05	
CS-137	NOT ESTAB	0.14(4/ 4)		TRM 388.0	0.15(2/ 2)		0.12(2/ 2)		
		0.07-	0.23		0.07-	0.23	0.06-	0.18	
K-40	NOT ESTAB	15.29(4/ 4)		TRM 388.0	15.86(2/ 2)		15.86(2/ 2)		
		13.31-	16.62		15.10-	16.62	14.88-	16.84	
MN-54	NOT ESTAB	0.05(4/ 4)		TRM 388.0	0.05(2/ 2)		0.05(2/ 2)		
		0.03-	0.07		0.03-	0.06	0.05-	0.06	
BI-214	NOT ESTAB	0.29(4/ 4)		TRM 391.2	0.31(2/ 2)		0.44(2/ 2)		
		0.19-	0.36		0.30-	0.32	0.36-	0.52	
BI-212	NOT ESTAB	0.40(3/ 4)		TRM 388.0	0.42(2/ 2)		0.63(2/ 2)		
		0.36-	0.47		0.36-	0.47	0.41-	0.86	
PB-214	NOT ESTAB	0.29(4/ 4)		TRM 391.2	0.30(2/ 2)		0.41(2/ 2)		
		0.23-	0.32		0.29-	0.32	0.32-	0.50	
PB-212	NOT ESTAB	0.31(4/ 4)		TRM 388.0	0.32(2/ 2)		0.34(2/ 2)		
		0.23-	0.37		0.26-	0.37	0.30-	0.38	
RA-226	NOT ESTAB	0.29(4/ 4)		TRM 391.2	0.31(2/ 2)		0.44(2/ 2)		
		0.19-	0.36		0.30-	0.32	0.36-	0.52	
BE-7	NOT ESTAB	1.22(4/ 4)		TRM 388.0	1.30(2/ 2)		1.30(2/ 2)		
		0.74-	1.85		0.74-	1.85	1.13-	1.47	
TL-208	NOT ESTAB	0.10(4/ 4)		TRM 388.0	0.11(2/ 2)		0.11(2/ 2)		
		0.08-	0.14		0.09-	0.14	0.11-	0.12	
AC-228	NOT ESTAB	0.62(4/ 4)		TRM 391.2	0.72(2/ 2)		0.92(2/ 2)		
		0.49-	0.74		0.70-	0.74	0.74-	1.10	
SR 89	NOT ESTAB	0.08(3/ 4)		TRM 391.2	0.15(1/ 2)		2 VALUES <LLD		
		0.02-	0.15		0.15-	0.15			
SR 90	NOT ESTAB	0.09(4/ 4)		TRM 391.2	0.10(2/ 2)		0.13(2/ 2)		
		0.05-	0.14		0.06-	0.14	0.08-	0.18	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

RESERVOIR MONITORING NETWORK

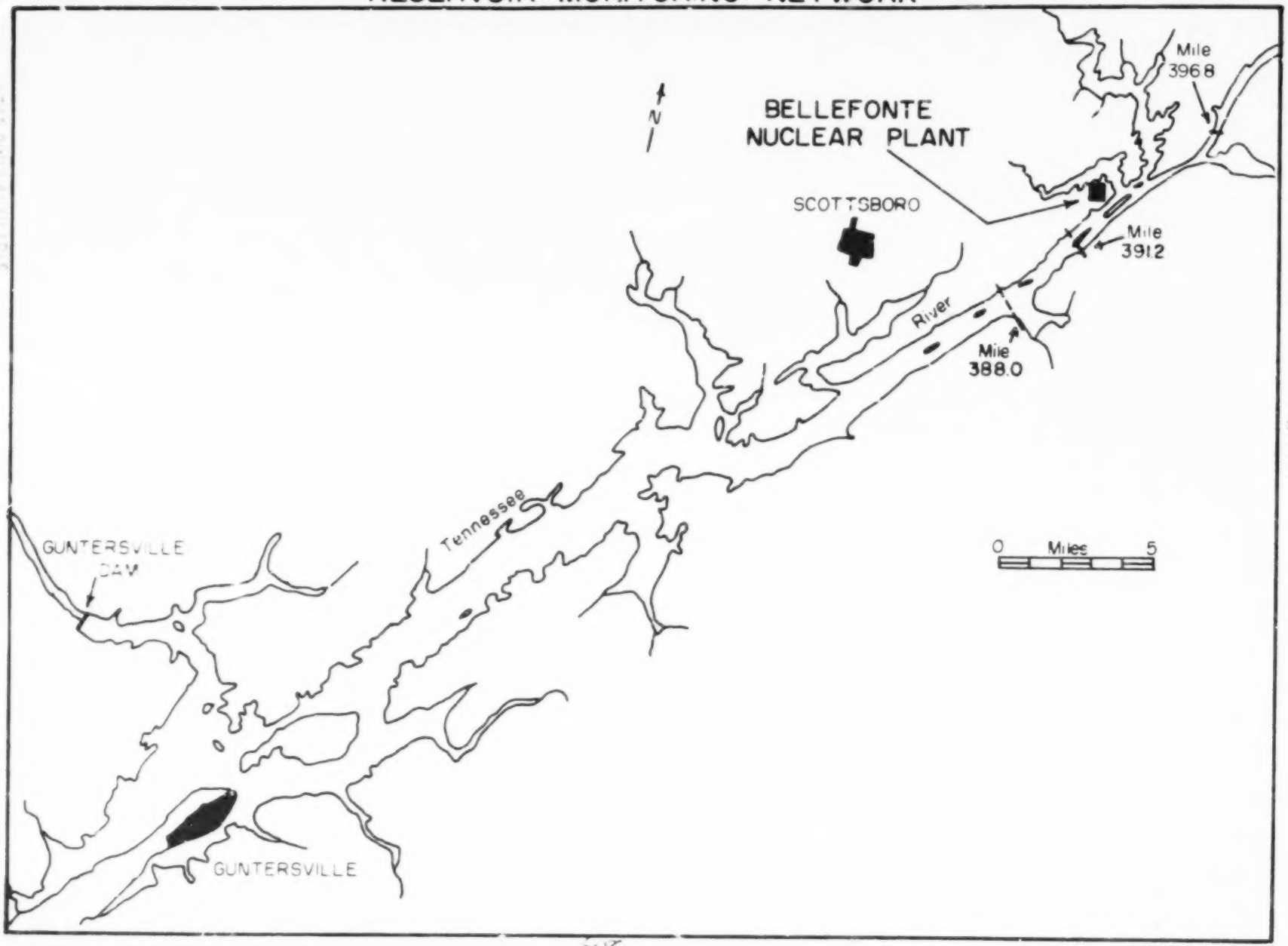

Figure 9

Quality Control

A quality control program has been established with the Alabama Department of Public Health Radiological Laboratory and the Eastern Environmental Radiation Facility, Environmental Protection Agency, Montgomery, Alabama. Samples of air, water, milk, fish, and soil collected around nuclear plants are forwarded to these laboratories for analysis, and results are exchanged for comparison.

Conclusions

Since BLN has not achieved criticality, there has been no contribution of radioactivity to the environment from the operation of the plant. The levels of radioactivity being reported in this document are due to natural background radiation, fallout from nuclear weapons testing, or other nuclear operations in the area.